Sox1 marks an activated neural stem/progenitor cell in the hippocampus.

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Public Summary:

Scientific Abstract:
The dentate gyrus of the hippocampus continues generating new neurons throughout life. These neurons originate from radial astrocytes within the subgranular zone (SGZ). Here, we find that Sox1, a member of the SoxB1 family of transcription factors, is expressed in a subset of radial astrocytes. Lineage tracing using Sox1-tTA;tetO-Cre;Rosa26 reporter mice shows that the Sox1-expressing cells represent an activated neural stem/progenitor population that gives rise to most if not all newly born granular neurons, as well as a small number of mature hilar astrocytes. Furthermore, a subpopulation of Sox1-marked cells have long-term neurogenic potential, producing new neurons 3 months after inactivation of tetracycline transactivator. Remarkably, after 8 weeks of labeling and a 12-week chase, as much as 44% of all granular neurons in the dentate gyrus were derived from Sox1 lineage-traced adult neural stem/progenitor cells. The fraction of Sox1-positive cells within the radial astrocyte population decreases with age, correlating with a decrease in neurogenesis. However, expression profiling shows that these cells are transcriptionally stable throughout the lifespan of the mouse. These results demonstrate that Sox1 is expressed in an activated stem/progenitor population whose numbers decrease with age while maintaining a stable molecular program.